

08/15/95 15:52 303 279 5525

SAIC GOLDEN

002

Informal Memo**SAIC TMSS Golden****Phone: 273-1250****Environmental Restoration
DOE/Rocky Flats Field Office****Fax: 279-5525****August 15, 1995**

To: Peg Withcill
OU 7 Manager
Environmental Restoration
DOE RFFO
Fax: 966-7447



000063492

As requested, enclosed are Technical Comments and Recommendations on the document titled "Draft Phase I IM/IRA Decision Document for Operable Unit 7 Present Landfill." Comments were obtained from TMSS personnel from both Environmental Restoration and from the Environmental Project Management Division of AMPME. Comments have also been obtained from DOE staff in the AMPME/Project Management Division. We do not believe that these comments impact the cost, schedule, or scope of the contract with Integrating Contractor (IC).

Comments from all sources have been combined and collated below. The AMPME/Project Management Division has indicated that they consider the resolution of comments 6, 9, and 10 of particular importance to the finalization of this document. We suggest that the IC should carefully consider how these comments should be resolved when deciding whether to directly transmit the current draft to the regulatory agencies or to incorporate these comments prior to submittal.

Comments have also been directly faxed to Steve Hahn of Kaiser-Hill as you requested.

cc:

J. Stover, DOE AMPME
S. Hahn, RMRS
R. Hennigard, SAIC
File

ADMIN RECCRD

BZ-A-000422

08/15/95

16:53

303 279 5525

SAIC GOLDEN

003

**Technical Review of Draft
"OU 7 Draft Phase I IM/IRA Decision Document"**

**TMSS/Environmental Restoration RFFO
TMSS/Project Management Division RFFO
DOE/Project Management Division RFFO
Comments and Recommendations to Environmental Restoration RFFO**

August 15, 1995

Specific Comments/Recommendations

1. Section 6.x.x.x "Detailed Analysis of Alternatives"
Mn as a COC. Mn and some other metals which occurred above background values were proposed, justified, and dropped as COCs at OU 1 and OU 2 prior to conducting the feasibility study for these OUs. Justifications and white papers were submitted to EPA and CDPHE discussing the sporadic, natural occurrence of Mn dioxide at RFETS and its potential to occur at high levels at some sites. Geochemical modeling has also been conducted which shows that Mn dioxide is not in equilibrium with UHSU groundwater and can be easily dissolved with fluctuations in the water table. Since Mn was not proposed for elimination prior to conducting the FS portion of this study, it is suggested that discussions regarding Mn be beefed up in Section 6.x.x.x "Compliance with ARARs", using information from OU 1 and from the geochemical modeling which has been done. These prior efforts should provide help in justifying the expectations that Mn will not achieve ARAR and that it is actually naturally occurring.
2. Section 6.4 and Table 6-4 "Summary of Comparative Analysis"
The 0-20 point weighting system which was devised and used needs to be explained further? Background discussion should be provided describing why a point system was designed and used since this is technically not a requirement under CERCLA. It is not clear from the discussion as to why a 0-20 point system was devised vs another point system (0-10) etc.? How was the "relative importance" of the CERCLA criteria for OU 7" determined? This statement is made without any further discussion or explanation (See also Comment 3 below).
3. Section 6.3.2 vs Section 6.4.
Section 6.4 states that short-term effectiveness is the lowest weighted comparative criteria relative to OU 7. Dust generation from construction and the potential for sediment loading to riparian zones and the pond areas may make this criteria extremely important because of possible disturbance to near-by Prebles Meadow Jumping mouse habitat. Short-term effectiveness will be an extremely important criteria at RFETS, given that dust generation and potential sediment loading to near-by riparian areas from any construction activity will be viewed by the USFWS as extremely important and potentially damaging. Short-term effectiveness may be extremely important (or equally important to other criteria) given that large differences exist between the potential dust generation which could be produced from the three different cap alternatives. The low weight given to this criteria should be thoroughly explained and even reconsidered to have equal weight as the other criteria.

2

2/6

4. Section 2.1.6

A description has been provided of OU 6 IHSSs 166.1, 166.2 and 166.3 (sludge pits) to the northeast of the landfill proper. These IHSSs are discussed nowhere else in the document, although they are shown on several of the figures that indicate the plan view of the cap. Some figures (like Figure 5-1) show the OU 6 IHSSs and indicate that the "extent of landfill cap" will cover part of IHSS 166.1. Other figures (like 5-2) show a smaller "cover area" corresponding to the "edge of landfill" and indicate the "edge of regrade area" in the same configuration as "edge of landfill cap" from the previous figure. Our interpretation is that landfill closure will not specifically address the OU 6 IHSSs but will incidentally encroach on 166.1. The document should make this (or what ever interpretation is proper) clear. The document should indicate that coordination is occurring between the two OUs and that the OU 6 DD will directly address these IHSSs.

5. Section 2.5.1, last bullet on page 2-24, and Section 2.5.8

The document apparently utilizes only one round of data for the Phase II wells downgradient of the East Landfill Pond dam. If later rounds of sampling show elevated contaminants, the no action determination for down-gradient ground water contamination could be compromised. Does RMRS plan to issue these later data when they are validated.

6. Sections 5.1.2, 6.2.2.2 and 8.17

The Stanley Lake Protection Project (SLPP) is incorrectly identified as providing mitigation wetlands to offset wetlands destruction caused by the OU 7 cap. The SLPP is a City of Westminster project funded with DOE grant moneys and the wetlands being created are not eligible to serve as a Rocky Flats wetland mitigation bank. An additional wetland acreage immediately adjacent to the SLPP wetland is currently being designed and is planned to serve as a mitigation wetland. The funding and schedule for construction of this wetland is currently uncertain because of other demands on grant funds. The document should be revised in the listed sections (and any other relevant sections) to indicate intent to offset the loss of the 1.1 acres of wetland in OU 7 with a portion of the 8 acre mitigation wetland adjacent to the SLPP pending final approval of the project. Furthermore, the timing of this potential wetland construction versus both landfill closure construction and implementation of the accelerated leachate collection and treatment action should be presented. If the Integrating Contractor (IC) organization has received any assurances from either the U.S. Fish and Wildlife Service and/or the EPA that either construction project can go forward in advance of mitigation wetland construction, we urge and suggest that those assurances be obtained in writing. We are requesting that the OU 7 project team maintain close contact with John Rampe, Senior Regulatory Advisor in AMPME, regarding developments on the funding and construction schedule for the mitigation wetland.

7. Sections 5.1.3 and 6.2.2.1

The slopes of the east face of the landfill cap have been changed from 6H:1V (16.67%) to 5H:1V (20%), which has apparently allowed the reduction of the fill layer volume from 225,000 cubic yards to 131,400 cubic yards. However, the 6:1 slope is still indicated on some of the figures (Figures 5-2 and 7-9). Also, in Section 5.1.3, the discussion of possibly using slopes different than 20% on the east face is semantically confusing. We think the intent was that a slope angle greater than 20% (i.e. steeper) could be used if the slurry wall is constructed sooner and ground water levels decrease within the landfill; please clarify.

8. Section 7.3.1.2 and Appendix J.

The erosion calculations for the 20% slope are reported in the text as being the same as for the 16.67 % slope in the Preliminary Draft DD: 1.8 tons/acre/year. Appendix J shows calculations for the 16.67 % slope but none for a 20% slope. The drainage area contributing flow to the 6:1 slope appears very large at 12.7 acres (Table J-1) or 12.2 acres (Attachment J1) certainly larger than the actual 6:1 or 5:1 sloped area on Figure (7-3), which we guesstimate at 4 to 8 acres. Also, the slope lengths listed in Attachment J1 range from 300 to 500 feet, but only the 300-foot length appears to have been used in the SEDCAD calculation. Even if the drainage area contributing flow were 12.2 or (12.7) acres, the 16.67 % slope area on which the erosion occurs is much less and would yield a higher erosion rate per acre. No matter how the erosion calculations are finalized, the IC should consider erosion controls on the steep eastern slope of the cap. Surface flow from the shallowly sloped upper sections of the cap should be diverted away from the steep slope and temporary slope protection measures should be incorporated into the design for the early post-construction stage before vegetation becomes established.

9. Draft Proposed Plan

The final sentence of the 4th paragraph on page 1 of the Draft Proposed Plan is erroneous. It reads, "This PP addresses only the presumptive remedy for landfill containment." The purpose of the focused risk assessment, which is incompletely presented on page 3 of the Draft PP, was to determine whether remediation is needed for pathways and media not addressed by the presumptive remedy. The Decision Document concludes that no action is needed for these media. The proposed plan is intended to be "comprehensive" and result in the issuance of a final CAD/ROD for OU 7, as we understand the process and project. Thus, the above quoted sentence should actually read something like, "This PP addresses the presumptive remedy for containment of the landfill source area and also addresses pathways and potentially contaminated media outside the source area, resulting in a Comprehensive Plan for OU 7."

10. General Re: Slurry Wall -- From the information presented, it appears that the slurry wall maintenance activity is an integral part of the remedial action. There is concern that since the slurry wall is only designated as a maintenance activity, it may be pushed aside and not completed. The Cap alone will not be an effective remedy. The Slurry Wall discussion in Section 1.3.2 should be strengthened. As an example, a reference to Section 1.3.2 could be placed in Chapter 7. It should ensure that the OU7 remedy is integrated and considers a phased approach with the slurry wall completed before the Cap. Completion of the slurry wall first will allow for an assessment of the wall and any possible corrective actions to take place before the Cap is in place. After the Cap is in place, any repairs or corrections to the wall probably will be much more costly. Also, a phased approach will allow progress to continue towards remediation without committing an undue portion of ER Program resources for a single Fiscal Year to OU7.

Apparently, the slurry wall is not incorporated into project cost estimates. The discussions about the slurry wall appear to presume that the reader knows about the wall. There is no clear, concise statement that the slurry wall is part of the Recommended Alternative. In Section 7.1, Recommended Alternative Description, the only mention of the slurry wall comes in the following sentence. "In addition, the proposed slurry wall eliminates 93 percent of the groundwater inflow as discussed in Section 2.3." This begs the question: Who is proposing the slurry wall and why is it in Appendix C, if it is not described as part of the Recommended Alternative? If it is not part of the Alternative why isn't there a Cap only scenario? The modeling scenarios do not match what is discussed in Section 7.1. The conceptual design in Section 7.3 does not discuss a slurry wall. Maintenance of a slurry wall was used to eliminate

4

4/16

RAOs and used in modeling scenarios as the only mechanism besides the cap to reduce groundwater inflows. There are statements throughout the document about how effectively the groundwater inflow will be reduced. This is only achieved by utilizing both the cap and slurry wall. If the slurry wall is part of the remedy, it should be discussed as such in the document in general.

11. Section 2.3.4.1, Figure 2-5
Figure 2-5 gives the appearance that the groundwater inflow under the groundwater intercept system comes only from a westerly direction. Need to improve Figure 2-5, possibly by referring to Sections 2.3.4.1 and 2.3.5 or marking on figure.
12. Section C.8.2, Last sentence in 1st paragraph
It is unclear what the author is attempting to discuss. It appears that the author is trying to discuss the mechanics of the model and pointing out that part of the modeling effort was to track water particles, not contaminants. A retardation factor of one represents no retardation relative to water movement. The purpose of the particle tracking should be discussed in the beginning of the section. This will strengthen the section.
13. Section C.8.2, 2nd Paragraph
Discussion in this paragraph needs to be strengthened to increase reader's understanding of modeling methodology and importance of slurry wall and cap. Several points could be added to improve section. There should be additional discussion about why an effective porosity of 0.3 was used when other studies have used a value of 0.1. We question the citations of Freeze and Cherry, 1989 and Fetter, 1988 for the statement in C.8.2 Particle Tracking which says that "Multiple sources report that effective porosity is approximately equal to overall porosity." The statement should be verified with a page number of section from the citation. Furthermore, the reference for Freeze and Cherry in Appendix C is wrong. The year should be 1979, as cited in the text document.
14. Section C.8.1
A "Cap Only" scenario should have been analyzed as a reasonable alternative to the no-action alternative. This may strengthen the case for the slurry wall. Also, brief descriptions should be provided for the different scenarios modeled.
15. Editorial Comment, Figure 2-17
The dark blue lines showing the groundwater areas above and below the dam are not noted under the Figure Explanation. The color used is difficult to distinguish from the other blue colors.

AMESH

Form 91-01

Rev. 2; 05/13/92

AMESH REVIEW OF TECHNICAL DOCUMENTS

REVIEW COMMENT RECORD

Document Reviewed (Title, Number, Revision, Date, etc.) Phase I IM/IRA Decision Document for Operable Unit 7 - Present Landfill, July 1995			Reviewer: Gail S. Hill Signature: Date: 8/31/95 Phone: x3424 Organization: Environmental Guidance Div.	Agreement with Dispositions: Date: Reviewer: Document Preparer:
Comment No.	Comment Type*	Para. No.	Comment	Disposition
1 General	E		There needs to be more information on what is proposed for the Landfill Pond Dam. Will it be breached and removed? Will it be maintained as is, or allowed to degrade?	
2	E	pg. 7-13, Section 7.3.6	There is not enough information on the disposition of the water from the Landfill Pond to other ponds. EG&G was supposed to drain as much water as possible from the Landfill Pond to the A-series ponds last summer, after concurrence was received from CDPHE. Since that did not happen, K-H or RMRS will need to be more detailed on their plans for transferring that water, and make those plans consistent with the pond operations plan now being refined.	
3	E	pg. 3-19, Section 3.4.2.1	Not all wetlands are waters of the U.S. Since the legal determination of whether the ponds on plant site are waters of the U.S. has not yet been decided either by policy from DOE-HQ, or by regulatory challenge, any reference to waters of the U.S. in this document needs to be removed.	

*Comment Type: E = Essential (agreement must be documented for other than verbal/in incorporation); S = Suggested; Non-C = Nonconc

MEMORANDUM

From: Steve Hahn/Kaiser Hill
 To: Laurie Peterson-Wright/
 Copies: Tim Hedahl/Kaiser Hill
 Date: August 14, 1995
 Subject: Comments on Draft IM/IRA Decision Document for OU7

Post-It™ brand fax transmittal memo 7671		# of pages 3
To: Laurie Peterson-Wright	From: Steve Hahn	
Co. Rm 12	Co. K-14	
Dept.	Phone # 9888	
Fax # 8663	Fax #	

Here are some comments on the IM/IRA Decision Document dated July 27, 1995. You have (or will receive) additional comments from Laura Brooks and Steve Nesta.

Slurry Wall. The proposed new slurry wall is not part of the Proposed Plan. However, the slurry wall is described, modeled, and evaluated in this IM/IRA document as if it were an integral part of the Proposed Plan. The proposed landfill cap is part of the Proposed Plan, and (as expected) the landfill cap is described, modeled, and evaluated in the IM/IRA document. It would seem to me that both actions should be treated in similar fashion, i.e., the cap and the wall should both be installed as "maintenance actions," or the cap and the wall should both be included in the Proposed Plan.

In any event, I'm not convinced that the slurry wall will accomplish a "60 percent reduction in leachate generation" as advertised. Here are some comments/questions concerning the slurry wall:

- The proposed slurry wall is located on the "wrong side" of the existing groundwater interception system. As a result, the perforated pipes currently in place will no longer serve their intended purpose of conveying "clean groundwater" around the landfill area. Instead, the pipes will collect leachate and discharge that leachate either into or below the below the East Landfill Pond.
- Except for a few hundred feet on the western end of the proposed slurry wall alignment, the slurry wall is oriented parallel to the general direction of groundwater flow. So what are you hoping to accomplish?
- The groundwater model presented in Appendix C assumes a hydraulic conductivity of 1×10^{-7} centimeters per second for slurry wall backfill material. It will be difficult/impossible to achieve a hydraulic conductivity that low using conventional slurry wall construction techniques and considering the effects of things like changes in bentonite clay chemistry as a result of contact with leachate contaminants, desiccation cracks, and freeze/thaw conditions. Think about it--the primary reason for rejecting Alternative 9 (see Page 6-21 of the IM/IRA Report) was concern over desiccation cracking in a clay layer placed below an FML and below a 36-inch-thick layer of protective soil. How do you intend to address these issues when you design the slurry wall?
- The western end of the slurry wall (i.e., the portion of the wall that is oriented perpendicular to the direction of groundwater flow) doesn't "tie in" with any geologic or man-made hydraulic barrier. As such, I am concerned about the potential for groundwater flow "around the end" of the wall at this location.

- The bottom of the proposed slurry wall is intended to "tie in" with relatively impervious bedrock materials. I question your ability in the field, with no opportunity to visually inspect the bedrock surface you are digging to, to know when you've dug deep enough (realize two previous attempts to do this at the site were unsuccessful).

Leachate Collection and Treatment. Because I have little confidence in the proposed slurry wall, I suggest you consider adding (in place of slurry wall or in addition to slurry wall) some type of permanent leachate collection and treatment system. Perhaps that's what you really intend to do, but the concept is not stated explicitly in the IM/IRA document. Paragraph 7.3.4 which reads, "a gravel blanket or French drain prevents seep water from building up and creating a seep in the new cap." That's the only reference I could find in the IM/IRA document to any type of permanent leachate collection and treatment.

Here's another puzzler: what do you intend to do with the groundwater (soon to become leachate after the slurry wall is constructed) that is currently and will continue to be collected in the perforated pipes that encircle the landfill? Plugging the pipes could cause leachate levels inside the landfill to rise. And I can't believe CDPHE will allow you to continue to discharge into the East Landfill Pond without treatment and without sampling.

Cap Cross Section. There are what appear to be some inconsistencies in describing the minimum design requirements for the landfill cap:

- A "presumptive remedy" approach that is applicable to municipal landfill sites is proposed,
- however, you state (Page 5-1) that CHWA requirements for closure of hazardous waste landfills apply;
- but you recommend a cap design (as presented in Table 7-2) that is a whole lot more protective than CHWA requirements and somewhat less protective than EPA Guidance for hazardous waste landfills.

I don't have a major problem with the Proposed Alternative 7 cross-section. However, the IM/IRA document should clearly establish the minimum design requirements.

Horizontal Limits of the Cap. It would appear (although not stated in the IM/IRA Document) that the area to be capped was expanded beyond the limits of the IHSS 114 to include the asbestos areas. That may be the proper thing to do, but I would like to understand the driver behind that decision, and I would like to know the additional cost involved. Construction of the cap provides "incidental coverage" of IHSS 203. However, the disposition of the remaining OU7 IHSSs are not specifically addressed in the IM/IRA document.

I understand the risk assessment concludes there is "no risk" associated with the remaining OU7 IHSSs, and "no further action" is required. Never-the-less, the proposed construction of the cap will disturb/alter these areas. For example, the East Landfill Pond will probably have to be permanently drained, and the sediments removed, in order to construct the cap. Is everybody okay with that? Are any precautions required? Do any laws/regulations govern? The same comment(s) apply to the sludge trenches.

Proposed Site Re-Grading. A significant portion of the total cost (approximately 1/3) be spent placing fill beneath the liner to achieve the desired maximum and minimum final cover slopes. The cost could go even higher if sufficient quantities of solid waste are not placed in the landfill before construction of the cap begins. Construction of this fill will not make the site safer; it will merely facilitate drainage and minimize erosion.

Therefore, I suggest a "value engineering" study of the proposed grading plan to ensure that the assumptions being made are not overly-conservative. For example, it might be determined that steeper side slopes covered with erosion resistant material (such as riprap) can be used on the eastern slope of the landfill in lieu of 5H:1V slopes covered with prairie grass. I also suggest that some brainstorming be done to explore the concept of using some type of waste material (e.g., solid waste from within the landfill, IDM material, pond sediments, D&D debris, etc.) to accomplish site grading below the clay liner in lieu of clean fill.

What to do with the dam? Take a look at Figure 5-1 and try to explain how the East Landfill Pond can be left in place. The reservoir will have to be drained, and the sediments removed, in order to construct the eastern end of the cap. And it doesn't make sense to re-fill the reservoir after construction is complete because that would submerge a portion of the cap. I expect the "right thing to do" is to breach the dam. Breaching the dam will also reduce future O&M costs and costs/risks associated dam safety regulations.

Perhaps I am overlooking something. However, the argument(s) in favor of "leaving the dam in place" are not effectively presented in the IM/IRA document.

Title. We went through an exercise recently for OUs 11 and 15 that involved writing a brief "Closure Plan" and putting that plan out for public comment. The drill was required when CDPHE indicated their unwillingness to sign the ROD when nothing with the words "Closure Plan" in the title had been out for public comment. We may find ourselves in the same boat for OU7. A potential solution could involve adding the phrase "... and Closure Plan" to the title of this document. Check with Dennis Shubbe and Laura Brooks to see if this is a real concern or not.

Gas Collection and Treatment. The IM/IRA document mentions the subject and indicates that specific design requirements will be determined at some future date. I am uncomfortable with this lack of specificity and failure to include \$\$s in the cost estimate. I anticipate the EPA, CDPHE and the public who review the IM/IRA will want to know if we intend to treat landfill gas or vent to the atmosphere.

September 6, 1995
2510-95/96

Ms. Laurie Peterson-Wright
Rocky Mountain Remediation Services, L.L.C.
PO Box 464, Bldg. 080
Golden, Colorado 80402-0464

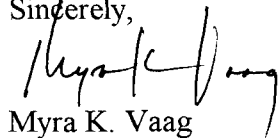
Subject: Submittal of Responses to Kaiser-Hill Comments on the
Draft Phase I IM/IRA Decision Document for Operable Unit No. 7
(MTS Task Order 353017TB3)

Dear Ms. Peterson-Wright:

Enclosed are responses to comments from Steve Hahn of Kaiser-Hill on the Draft Phase I IM/IRA Decision Document (IM/IRA DD) for OU 7, as discussed in our meeting on August 31, 1995.

Stoller would be happy to continue supporting RMRS on the OU 7 project through completion of the Title II design for landfill closure. Please call with questions or further comments.

Sincerely,



Myra K. Vaag
Project Manager

Enclosure

cc:	A. Crockett	Stoller
	C. Gee	Stoller
	B. Stephanus w/o	Stoller
	MKV Chron w/o	
	OU7 Project File	

1/15

10

Responses to Kaiser Hill Comments on Draft IM/IRA Decision Document for OU 7

Background

The IM/IRA for the Present Landfill has a long history. As a result of frequent personnel changes at DOE, EPA, CDPHE, and EG&G (RMRS), many options have been considered for the grading plan, cap cross section, leachate treatment systems, slurry wall configuration, fate of the East Landfill Pond, downgradient groundwater treatment systems, and other environmental media at OU 7. The options have been combined into a myriad of alternatives. The recommended alternative in the Draft Phase I IM/IRA Decision Document is technically and politically driven. The following assumptions, based on direction from DOE, have been incorporated into the recommended alternative:

- leachate collection is required under the dispute resolution for the pond water IM/IRA
- a temporary leachate collection and treatment system will be constructed at the seep under an accelerated action prior to landfill closure
- the leachate collection and treatment system will be passive
- delisting of leachate is proposed so that leachate will not be treated indefinitely
- mitigation of wetlands and Preble's meadow jumping mouse habitat injured during construction of the leachate collection and treatment system will be addressed later prior to final closure of the landfill
- the slurry wall is a component of the presumptive remedy to address source area groundwater controls
- the slurry wall will be constructed as a maintenance action before construction of the final cap
- soils excavated during construction of the leachate collection and treatment system and slurry wall will be disposed in the landfill
- the East Landfill Pond will remain in place after closure
- all media that do not pose a risk will remain in place

- subsurface soils from IHSSs 166.1, 166.2, and 166.3 are not sources of contamination and require no further action; soils will remain in place and will not be capped
- the IHSS 114 boundary has been modified to include the asbestos and associated waste disposal areas and the East Landfill Pond sediments
- the final cap will be functionally equivalent to a RCRA cap

The recommended alternative presented in the decision document is a viable alternative and is viewed as a starting point for negotiation. However, the alternative will likely be modified to address CDPHE, EPA, DOE, and Kaiser-Hill concerns.

Presumptive Remedy

The presumptive remedy approach was used for the IM/IRA. The presumptive remedy for CERCLA municipal landfills is containment.

Remdial action objectives (RAOs) for presumptive remedy components of OU 7 (the landfill), which will remain a long-term waste management area, are specified in EPA guidance and include the following (EPA 1993a):

- Prevent direct contact with landfill contents
- Minimize infiltration and resulting contaminant leaching to groundwater
- Control surface-water run-off and erosion
- Control landfill gas (treat as needed)
- Collect and treat leachate at the source (as needed)
- Control groundwater at the source to contain the plume

Chapter 3 discusses how RAOs for the other non-presumptive remedy components at OU 7 were eliminated from the final response action because of one or more of the following:

- there is no risk to the potential receptor
- analytes do not exceed ARARs
- the exposure pathway is incomplete

In the recommended alternative, the first three RAOs are addressed by the landfill cap. Control of landfill gas is accomplished by the gas collection layer in the cap with the existing impermeable barrier and the proposed slurry wall preventing lateral migration. There is no risk to human health associated with leachate and the seep will be capped thus eliminating the exposure pathway. The proposed slurry

3

12

wall addresses groundwater control at the source by redirecting upgradient inflow of clean groundwater away from the landfill.

Slurry Wall

1. *The proposed new slurry wall is not part of the Proposed Plan. However, the slurry wall is described, modeled, and evaluated in this IM/IRA document as if it were an integral part of the Proposed Plan. The proposed landfill cap is part of the Proposed Plan, and (as expected) the landfill cap is described, modeled, and evaluated in the IM/IRA document. It would seem to me that both actions should be treated in similar fashion, i.e., the cap and the wall should both be installed as "maintenance actions," or the cap and the wall should both be included in the Proposed Plan.*

During a project meeting on April 25, 1995, DOE proposed and CDPHE and EPA agreed to construct the slurry wall as an accelerated action before construction of the final cap to address failure of the existing groundwater intercept system and reduce the amount of groundwater inflow to the landfill and resulting contaminant leaching (letter from DOE to EPA and CDPHE, dated May 1, 1995). CDPHE and EPA later decided that the slurry wall does not meet the objective of the dispute resolution for the pond water IM/IRA. DOE proposed a passive system as an interim action for collection and treatment of water from the seep, and proposed that the slurry wall be constructed as a maintenance action. CDPHE and EPA approved the proposal (letter from CDPHE to DOE, dated June 27, 1995).

2. *In any event, I'm not convinced that the slurry wall will accomplish a "60 percent reduction in leachate generation" as advertised.*

The 60 percent reduction in leachate generation is based on MODFLOW groundwater flow modeling as presented in Appendix C of the Draft Phase I IM/IRA Decision Document. As with any numerical groundwater modeling, the solution is non-unique (multiple different solutions possible). The hypothesis that the north groundwater intercept is not functioning properly is put forth in Section 2.5.3.1 of the Final Work Plan Technical Memorandum, Operable Unit No. 7, September 2, 1994. The major evidence supporting this hypothesis is the "bulge" of the 5970 feet equipotential line into the landfill mass (see Figure 2-9, Decision Document), water levels in individual wells, the fact that the groundwater intercept is not tied into weathered bedrock in this area, and analysis of chemical data from wells in the area. The water level in well 6287 is a strong indicator that the groundwater intercept system is not acting as designed. At well 6287, approximately 13.5 feet of saturated thickness existed in 2nd quarter 1995. Well 6287 is placed within the sand/gravel drainage layer and is less than five feet from

the groundwater intercept pipe (Figure 2-6, Decision Document and Figure 2-11, Final Work Plan). The "bulge" of groundwater into the landfill (higher than expected head in the center of the landfill) can be explained in three ways: (1) influx of groundwater through or under the north groundwater intercept, (2) unusually high recharge of precipitation in the center of the landfill, or (3) recharge of surficial materials from the weathered bedrock below. There is no evidence supporting (2) or (3). Therefore, influx of groundwater through or under the north groundwater intercept is considered the most likely explanation.

Drain cells used to simulate the groundwater intercept system were shut off in the area where failure of the groundwater intercept system is suspected. Simulated heads using this approach provide a good approximation of the actual measured heads (see Figure C-9, Decision Document). The model was calibrated using hydraulic conductivity values and heads obtained in the site investigation. The values used for hydraulic conductivity and recharge are in line with the values used in the sitewide groundwater model. The modeled values for recharge and groundwater influx are only estimates, but they are the best estimates based on the available data.

The model estimates that 1.9 gpm flows into and out of the landfill mass under the no action scenario. Approximately 1.1 gpm of this flow is groundwater inflow. The simulated groundwater inflow rate with the addition of the north slurry wall is 0.4 gpm. This modeling simulates a low to moderate flow condition. When flow increases in the spring, the majority of this increased flow probably comes from recharge (most of the peaking flow is due to recharge, not groundwater inflow). The flow reduction of 0.7 gpm will be fairly constant throughout the year, while the flow reduction from the cap will vary based on the season. Any cost/benefit analysis of the slurry wall could be based on 0.7 gpm reduction in flow and treatment volume (realizing that this flow is an estimate only).

The slurry wall is one component of a closure strategy that seeks to delist seep water and groundwater. This argument is based on focused risk assessments and bolstered by the premise that flows out of the landfill will decrease over time because of the combined influence of the cap and the slurry wall. If the agencies reject this strategy and require treatment of seep water and groundwater, more detailed cost/benefit analysis for the slurry wall should be performed. Preliminary cost/benefit analyses show that construction of the slurry wall is more cost effective than pumping, trucking, and treating the leachate. If the agencies would agree to delisting the seep water and groundwater even without the slurry wall, then the slurry wall should not be built.

Here are some comments/questions concerning the slurry wall:

3. *The proposed slurry wall is located on the "wrong side" of the existing groundwater interception system. As a result, the perforated pipes currently in place will no longer serve their intended purpose of conveying "clean groundwater" around the landfill area. Instead, the pipes will collect leachate and discharge that leachate either into or below the East Landfill Pond.*

The proposed slurry wall must be located outside the area of waste so that clean groundwater does not become contaminated. The groundwater-intercept trench was backfilled with landfill waste (Figure 2-2), thus necessitating that the slurry wall be located outside the trench.

The actual mechanism of the failure of the existing groundwater intercept system is unknown. Two possibilities exist: the clay barrier has failed or the drain pipe is blocked and the water is flowing in the path of least resistance- under the barrier. Note that according to the as built, the barrier was not keyed into the bedrock. Keying into the bedrock was not necessary in the original design because if the pipe was blocked flow would move around the block in the gravel blanket. However, it is believed that the construction of the slurry wing walls blocked this bypass route.

If the clay barrier has failed, leachate could theoretically flow back into the groundwater-intercept trench (Figure 2-9 and 2-10 Potentiometric Maps). This is possible although not likely, because the hydraulic gradient inside the landfill strongly directs the flow of water toward the seep. This gradient is shown on the potentiometric surface maps and is due to the weathered bedrock topography, which forms the bottom of the surficial materials flow layer. The evidence does not support that the groundwater intercept system is capable of lowering the head to an extent that would reverse the current flow direction. For example, at well 6287, approximately 13.0 feet of saturated thickness existed in 2nd quarter 1995. Well 6287 is placed within the sand/gravel drainage layer and is less than five feet from the groundwater intercept pipe. As a precaution the pipe could be blocked during installation of the slurry wall. This would involve excavation into the landfill waste and therefore increased H&S costs. We could also attempt to close the valves.

4. *Except for a few hundred feet on the western end of the proposed slurry wall alignment, the slurry wall is oriented parallel to the general direction of groundwater flow. So what are you hoping to accomplish?*

While it is true that the general flow of groundwater at Rocky Flats is from west to east, the question at hand is whether groundwater flows from outside of the landfill into the landfill. If a pathway exists, groundwater always flows from high head to

low head. As illustrated by Figure 2-9, (Decision Document) a significant hydraulic gradient exists from the outside of the landfill (near well 70093) to the center of the landfill. A pathway exists under the groundwater intercept system.

The slurry wall extends to the east beyond the extent of the waste so that clean groundwater is directed beyond the waste before being allowed to follow its natural flow path toward the center of the valley as shown in Figure 2-7 (Groundwater Flowpaths from the Landfill) and Figure 2-9 and 2-10 (Potentiometric Maps).

5. *The groundwater model presented in Appendix C assumes a hydraulic conductivity of 1×10^{-7} centimeters per second for slurry wall backfill material. It will be difficult/impossible to achieve a hydraulic conductivity that low using conventional slurry wall construction techniques and considering the effects of things like changes in bentonite clay chemistry as a result of contact with leachate contaminants, desiccation cracks, and freeze/thaw conditions. Think about it—the primary reason for rejecting Alternative 9 (see Page 6-21) of the IM/IRA Report) was concern over desiccation cracking in a clay layer placed below an FML and below a 36-inch thick layer of protective soil. How do you intend to address these issues when you design the slurry wall?*
 - a. Slurry walls with permeabilities as low as 5×10^{-9} cm/sec have been built and as reported in EPA Engineering Bulletin: Slurry Walls (EPA/540/S-92/008, Oct. 92). Changes in permeability as a result of contact with leachate may occur. However, compatibility testing has been conducted using OU 7 leachate and permeabilities of the slurry mixes are 1×10^{-8} cm/sec (see attached preliminary results). Literature indicates that high concentrations, free product are the primary cause of compatibility problems. These are not present in OU 7 leachate.
 - b. Desiccation cracks - prevented with proper design. Some cracking may occur in unsaturated zone but this will not effect the effectiveness of the slurry wall. Minor cracks will heal when bentonite swells after exposure to water.
 - c. Freeze thaw cycles-The slurry wall will be below the cap and therefore below frost level. If the slurry wall is constructed prior to the cap, it is proposed that a berm be placed over the center of the slurry wall to prevent damage to the wall, accommodate settlement and insulate the backfill.

6. *The western end of the slurry wall (i.e., the portion of the wall that is oriented perpendicular to the direction of groundwater flow) doesn't "tie in" with any geologic or man-made hydraulic barrier. As such, I am concerned about the potential for groundwater flow "around the end" of the wall at this location.*

The wall is designed to extend approximately 100 feet past the groundwater divide so that flow should continue in this direction. However, it is possible that some water may flow around the end. The quantity is considered insignificant.

Consideration was given to a tie in or extending the wall further. Neither option was deemed cost effective for the amount of water that might enter the landfill.

A tie in to the south groundwater interceptor system was considered. Capital costs for the tie in were estimated at \$36,000. The tie in would involve excavation into the landfill waste and would therefore increase H&S costs. In addition it is possible that the existing south groundwater intercept pipe would be damaged thus causing problems similar to those on the north side.

The slurry wall could be extended further to the east to be conservative. However, any groundwater moving around the edge of the slurry wall will flow into the south intercept drain. The cost of extending the slurry wall would be approximately \$2,600/100 feet assuming an average depth of 20 feet.

7. *The bottom of the proposed slurry wall is intended to "tie in" with relatively impervious bedrock materials. I question your ability in the field, with no opportunity to visually inspect the bedrock surface you are digging to, to know when you've dug deep enough (realize two previous attempts to do this at the site were unsuccessful).*

The bottom of the slurry wall is proposed to be embedded into the weather bedrock a minimum of 5 feet. This is at the upper end of recommendations for embedment into a lower permeability layer as recommended in the literature. In addition, a detailed CQC and CQA program is proposed to verify the depth and embedment.

- CQC requirements include full-time observation by Contractor with recorded depth measurements every 5 feet.
- CQA requirements include confirmation depth measurements every 200 feet with laboratory analysis of collected samples to confirm classification of weathered bedrock.

Although the "bedrock surface" cannot be visually inspected, the excavated material can be examined. As noted in comment 1, there was no attempt to key the

groundwater intercept system into bedrock. An experienced company with good CQA is essential to constructing an effective slurry wall.

Leachate Collection and Treatment

8. *Because I have little confidence in the proposed slurry wall, I suggest you consider adding (in place of slurry wall or in addition to slurry wall) some type of permanent leachate collection and treatment system. Perhaps that's what you really intend to do, but the concept is not stated explicitly in the IM/IRA document. Paragraph 7.3.4 which reads, "a gravel blanket or French drain prevents seep water from building up and creating a seep in the new cap." That's the only reference I could find in the IM/IRA document to any type of permanent leachate collection and treatment.*

Due to the long term expense and lack of risk to human health and terrestrial or aquatic organisms, DOE directed that the IM/IRA DD not include a leachate collection and treatment facility.

Consideration had been given to trucking or pumping to OU1/OU2, onsite conventional treatment and an onsite passive treatment system.

However cost estimates for these options were never fully developed. Ballpark estimates are given in Table 1, along with the cost of the slurry wall. Costs for the on-site treatment facility include providing electricity to the site.

Table 1
Groundwater Collection and Treatment
Preliminary Cost Estimates¹

	Truck to OU 1/OU2	On-site Treatment	Slurry Wall
Capital	\$521,000	\$440,000	\$1,000,000
Annual O&M	\$1,314,000	\$115,000	\$0
Total Present Worth over 30 years	\$26,437,220	\$2,693,034	\$1,000,000

¹ Assumes a design flow of 5 gpm.

If, in reviewing the IM/IRA DD, the regulatory agencies determine that ARARs, and not risk, is the driving factor or that the leachate cannot be delisted, treatment may be required. In this case the slurry wall would have to be examined in relationship to the potential cost savings in treatment resulting from the decrease in flow.

9. *Here's another puzzler: what do you intend to do with the groundwater (soon to become leachate after the slurry wall is constructed) that is currently and will continue to be collected in the perforated pipes that encircle the landfill? Plugging the pipes could cause leachate levels inside the landfill to rise. And I can't believe CDPHE will allow you to continue to discharge into the East Landfill Pond without treatment and without sampling.*

If the clay barrier is breached, leachate could theoretically flow back into the groundwater intercept pipe. However, the hydraulic gradient strongly promotes flow in the opposite direction. This gradient is shown on the potentiometric surface maps and is due to the weathered bedrock topography, which forms the bottom of the surficial materials flow layer (see Figure 2-17, Final Work Plan). As a precaution the pipe may be breached during installation of the slurry wall. This may involve excavation into the landfill waste and therefore would increase H&S costs. Another alternative would be to attempt to close valves.

It is unlikely that plugging the north pipe will cause an increase in the level of leachate in the landfill. Leachate within the landfill will still flow freely to the east, in the direction of the hydraulic gradient. The slurry wall and cap will cut off inflow into the groundwater intercept system and the landfill mass, reducing flows to the pond. No flow has been reported from the north or south groundwater intercept discharge points in No Name Gulch during the past 4 years. Records prior to that are not readily available.

Cap Cross Section

10. *There are what appear to be some inconsistencies in describing the minimum design requirements for the landfill cap:*

- *A "presumptive remedy" approach that is applicable to **municipal landfill sites** is proposed,*
- *however, you state (Page 5-1) that CHWA requirements for closure of **hazardous waste landfills** apply;*
- *but you recommend a cap design (as presented in Table 7-2) that is a whole lot more protective than CHWA requirements and somewhat less protective than EPA Guidance for **hazardous waste landfills**.*

I don't have a major problem with the Proposed Alternative 7 cross-section. However, the IM/IRA document should clearly establish the minimum design requirements.

The presumptive remedy approach is for CERCLA Municipal Landfill Sites. These are municipal landfills, such as the OU 7 Present Landfill, that have received hazardous waste. Thus CHWA requirements for closure of hazardous waste landfills apply.

The recommended cap design meets the CHWA requirements. EPA guidance documents were used as just that -guidance. The requirements for closure are outlined in Section 7.2.2.3. Each of the alternatives must, as a minimum meet the regulatory requirements, then, each alternative is evaluated based on the seven CERCLA criteria as shown in Figure 6-4. Alternative 7 ranked the highest based on these criteria. In addition, the project team felt that this alternative was the most likely to be approved by CDPHE/EPA.

Horizontal Limits of the Cap

11. It would appear (although not stated in the IM/IRA Document) that the area to be capped was expanded beyond the limits of the IHSS 114 to include the asbestos areas. That may be the proper thing to do, but I would like to understand the driver behind that decision, and I would like to know the additional cost involved.

The extent of the waste was expanded to include the asbestos disposal areas because research on the asbestos and aerial photographs indicated that there was waste disposed in this area as discussed in Section 2.1.3. The boundary was not extended specifically to include the asbestos areas, but to include additional waste identified in the area. It was determined to be more cost effective to cover over the asbestos then to do the additional investigation required to delineate the waste and asbestos and then try to construct the cap around them particularly since intrusive investigation in the asbestos areas would be high risk. The IHSS 114 boundary, which delineates the extent of the landfill waste, has been modified to include the waste disposal areas in or near the asbestos disposal pits. The text will be modified to clarify this change.

11a. Construction of the cap provides "incidental coverage" of IHSS 203. However, the disposition of the remaining OU7 IHSSs are not specifically addressed in the IM/IRA document.

See Comment 12.

12. I understand the risk assessment concludes there is "no risk" associated with the remaining OU7 IHSSs, and "no further action" is required. Never-the-less, the proposed construction of the cap will disturb/alter these areas. For example, the East Landfill Pond will probably have to be permanently drained, and the sediments removed, in order to construct the cap. Is everybody okay with that?

Are any precautions required? Do any laws/regulations govern? The same comment(s) apply to the sludge trenches.

The nature and extent of contamination in surface soils in IHSSs 167.2 and 167.3 (spray evaporation areas) is described in Section 2.5.6. A focused risk assessment was performed because surface soils are not part of the presumptive remedy. Results indicate that there is no risk to human health from incidental ingestion, particulate inhalation, or external irradiation from surface soils in spray evaporation areas. Therefore, DOE proposes to leave the surface soils undisturbed.

Sediments in the East Landfill Pond are included within the modified boundary of IHSS 114. Based on results of the PRG screen and the ecological risk assessment, no response action is required for sediments because they pose no risk to human health and minimal risk to aquatic life and wildlife. DOE proposes to leave the pond sediments in place.

Based on DOE direction the East Landfill Pond will not be drained. Because the pond intercepts the groundwater table, the area would not only have to be drained but filled in to above the groundwater table. Seep flow into the pond would have to be eliminated or a sump installed to pump water out. Alternatively the dam could be removed but this would likely require a groundwater collection and treatment system downstream of the dam (see comment 8 for costs).

DOE proposed no further action for soils in IHSSs 166.1, 166.2, and 166.3 (sewage sludge trenches) (Human Health Risk Assessment for the Walnut Creek Priority Drainage, October 1994 Letter Report). Groundwater beneath these IHSSs is to be addressed under the OU7 IM/IRA. The proposed landfill cap will eliminate recharge to groundwater in the vicinity of the trenches and will reduce the overall groundwater flow.

Proposed Site Re-Grading

- 13. A significant portion of the total (approximately 1/3) be spent placing fill beneath the liner to achieve the desired maximum and minimum final cover slopes. The cost could go even higher if sufficient quantities of solid waste are placed in the landfill before construction of the cap begins. Construction of this fill will not make the site safer; it will merely facilitate drainage and minimize erosion.*

Therefore, I suggest a "value engineering" study of the proposed grading plan to ensure that the assumptions begin made are not overly-conservative. For example, it might be determined that steeper side slopes covered with erosion resistant material (such as riprap) can be used on the eastern slope of the landfill in lieu of 5H:1V slopes covered with prairie grass. I also suggest that some brainstorming

be done to explore the concept of using some type of waste material (e.g., solid waste from within the landfill, IDM material, pond sediments, D&D debris, etc.) to accomplish site grading below the clay liner in lieu of clean fill.

A value engineering study of the proposed grading plan will be performed if requested.

The placement to fill to achieve final grades is a large cost component. We have assumed that material would come from off site and therefore, transportation of the material is a large portion of the costs. The volumes calculated for fill are based on December 1994 survey. This assumes that approximately 115,000 cy of fill will be placed between now and the cover construction. The schedule for landfill closure has been accelerated and as a result, there will be less waste material disposed in the landfill. Brainstorming on how to decrease the amount of clean fill material required has been done during past technical working group meetings.

Strategically placing incoming waste material was considered, but because of recycling and other waste reduction efforts, the amount of waste material that will be disposed before closure will not significantly reduce the volume of fill required. Actual filling rates can be monitored to determine if this is a reasonable assumption. Regrading the existing mound of waste was considered, but once again, the volume of waste in the mound is insignificant compared to the amount of fill required.

Excavated soil generated during construction of the leachate collection/treatment system and excavated waste and excess slurry from construction of the slurry wall will be disposed at the landfill. DOE proposed that drums of field investigation derived material (IDM) be disposed in the landfill before the cap is put in place (letter from DOE to CDPHE and EPA, dated April 28, 1995). Because of questions concerning the "no rad added" policy, the proposal has not yet been approved. Finally, placement of D&D debris in the landfill is not possible because the landfill is scheduled for closure before the debris will be generated.

What to do with the dam?

14. *Take a look at Figure 5-1 and try to explain how the East Landfill Pond can be left in place. The reservoir will have to be drained, and the sediments removed, in order to construct the eastern end of the cap. And it doesn't make sense to refill the reservoir after construction is complete because that would submerge a portion of the cap. I expect the "right thing to do" is to breach the dam. Breaching the dam will also reduce future O&M costs and costs/risks associated dam safety regulations.*

The pond will not have to be fully drained. The primary reason for placing fill within the pond area is to increase the stability of the side slopes of the landfill. The sediments within the pond footprint are very thin (on the order of 1 foot). Therefore, it is expected that fill could be dozed into the pond to displace the sediments or alternatively the fill could be placed over the sediments. The cover section would be limited to an elevation above the spillway elevation. It is planned that a subsurface drain would be included in the general fill placed in this area to control seepage.

15. *Perhaps I am overlooking something. However, the argument(s) in favor of "leaving the dam in place" are not effectively presented in the IM/IRA document.*

DOE directed that the dam and pond stay in place. The dam provides a subsurface barrier to groundwater flow and the pond serves as a natural treatment system (aeration and biological activity for organics, settling and adsorption for metals), and will decrease the area requiring wetlands mitigation. Note that the pond itself is considered a wetlands. Completely removing the pond would require mitigation of 3.06 acres at 3 to 1 ratio resulting in a total of 9.18 acres for an estimated cost of \$367,200. It should be noted that the wetlands mitigation area at Standley Lake is only 8 acres so that another mitigation area would have to be found. Alternative 7 requires mitigation of 1.09 acres at a cost of \$140,000. If collection and treatment of seep water and groundwater is a given, the retention of the dam is not important to groundwater quality.

If the dam is removed, it is likely that the groundwater below the landfill will have to be collected and treated over the 30 year closure period. See Table 1 under Comment 8.

Title

16. *We went through an exercise recently for OUs 11 and 15 that involved writing a brief "Closure Plan" and putting that plan out for public comment. The drill was required when CDPHE indicated their unwillingness to sign the ROD when nothing with the words "Closure Plan" in the title had been out for public comment. We may find ourselves in the same boat for OU7. A potential solution could involve adding the phrase "... and Closure Plan" to the title of this document. Check with Dennis Shubbe and Laura Brooks to see if this is a real concern or not.*

The title of the document will include "Closure Plan" for the draft final version, which goes out for public comment in December 1995.

Gas Collection and Treatment

17. *The IM/IRA document mentions the subject and indicates that specific design requirements will be determined at some future date. I am uncomfortable with this lack of specificity and failure to include \$\$s in the cost estimate. I anticipate the EPA, CDPHE and the public who review the IM/IRA will want to know if we intend to treat landfill gas or vent to the atmosphere.*

Calculations at this point indicate that treatment is not required and therefore landfill gas will be vented to the atmosphere (Section 7.3.5). Landfill gas may be diffusing through the interim soil cover and reaching the atmosphere. Once the cap is in place landfill gases will be controlled by the gas-collection layer in the cover and will be vented to the surface at discrete points; no diffusion will take place. For this reason, concentration of HAPs may be greater than they are at the present time.

As stated in section 7.2.2.3, "Specific controls for gas emissions from the landfill are not expected to be required based on estimated emission rates of NMOCs (Appendix I). Due to potential future changes in gas emissions resulting from the construction of the proposed slurry wall maintenance action and the final cover, it is proposed that the landfill gas be monitored..."

A gas treatment system can be added to the proposed gas collection system without costly modification.